FIG. 1

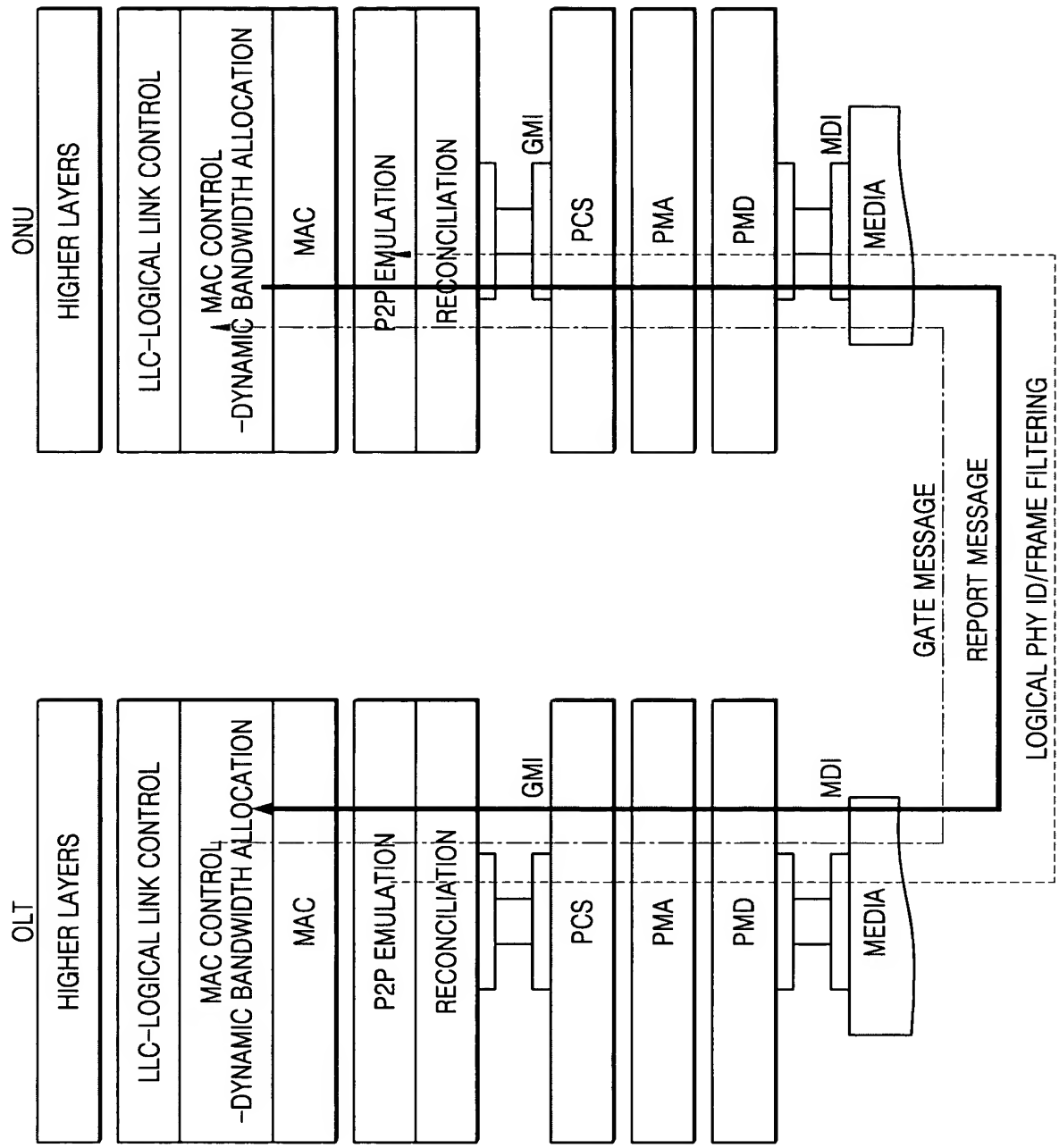

ONU
HIGHER LAYERS
LLC-LOGICAL LINK CONTROL
MAC CONTROL
-DYNAMIC BANDWIDTH ALLOCATION
MAC
P2P EMULATION
RECONCILIATION
GMI
PCS
PMA
PMD
MDI
MEDIA
OLT
HIGHER LAYERS
LLC-LOGICAL LINK CONTROL
MAC CONTROL
-DYNAMIC BANDWIDTH ALLOCATION
MAC
P2P EMULATION
RECONCILIATION
GMI
PCS
PMA
PMD
MDI
MEDIA
GATE MESSAGE
REPORT MESSAGE
LOGICAL PHY ID/FRAME FILTERING

FIG. 2

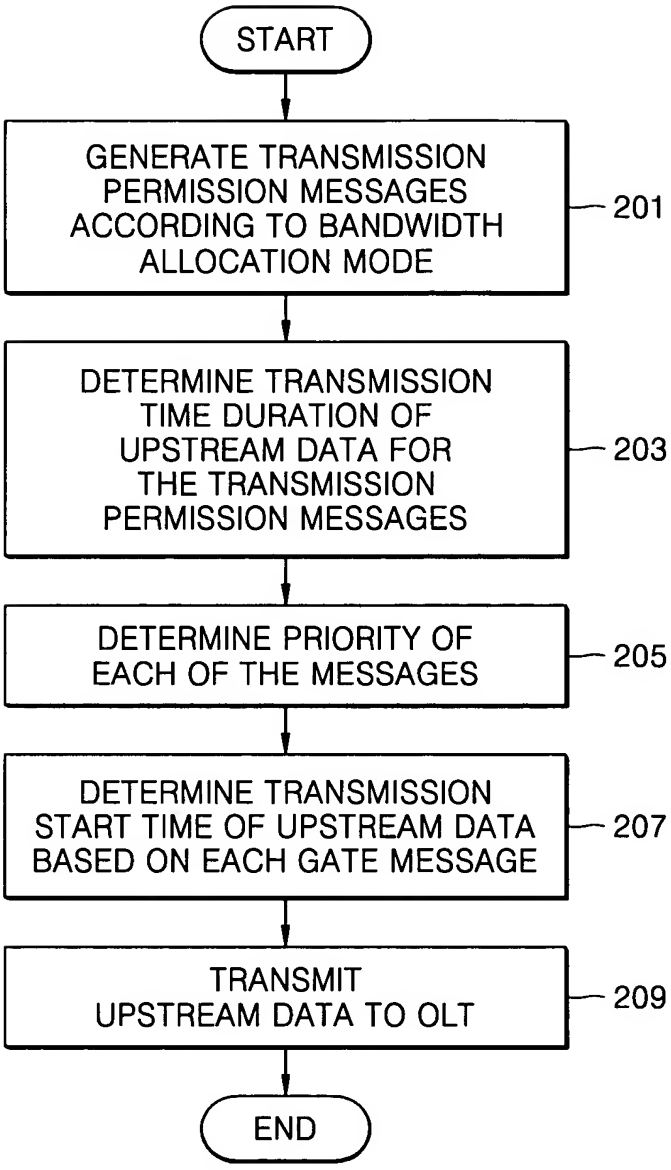

START
GENERATE TRANSMISSION PERMISSION MESSAGES ACCORDING TO BANDWIDTH ALLOCATION MODE
201
DETERMINE TRANSMISSION TIME DURATION OF UPSTREAM DATA FOR THE TRANSMISSION PERMISSION MESSAGES
203
DETERMINE PRIORITY OF EACH OF THE MESSAGES
205
DETERMINE TRANSMISSION START TIME OF UPSTREAM DATA BASED ON EACH GATE MESSAGE
207
TRANSMIT UPSTREAM DATA TO OLT
209
END

FIG. 3A

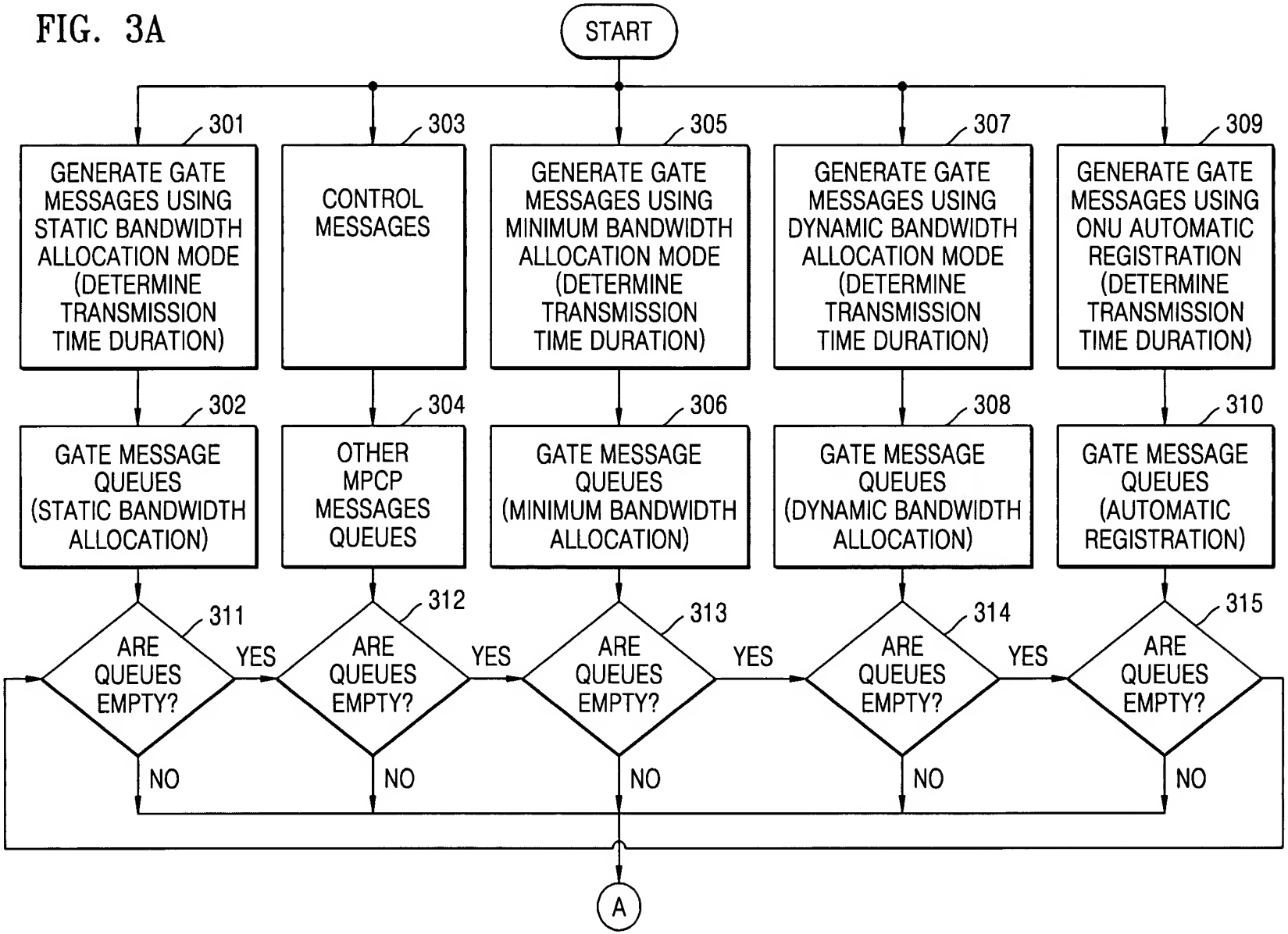

START
301
GENERATE GATE MESSAGES USING STATIC BANDWIDTH ALLOCATION MODE (DETERMINE TRANSMISSION TIME DURATION)
303
CONTROL MESSAGES
305
GENERATE GATE MESSAGES USING MINIMUM BANDWIDTH ALLOCATION MODE (DETERMINE TRANSMISSION TIME DURATION)
307
GENERATE GATE MESSAGES USING DYNAMIC BANDWIDTH ALLOCATION MODE (DETERMINE TRANSMISSION TIME DURATION)
309
GENERATE GATE MESSAGES USING ONU AUTOMATIC REGISTRATION (DETERMINE TRANSMISSION TIME DURATION)
302
GATE MESSAGE QUEUES (STATIC BANDWIDTH ALLOCATION)
304
OTHER MPCP MESSAGES QUEUES
306
GATE MESSAGE QUEUES (MINIMUM BANDWIDTH ALLOCATION)
308
GATE MESSAGE QUEUES (DYNAMIC BANDWIDTH ALLOCATION)
310
GATE MESSAGE QUEUES (AUTOMATIC REGISTRATION)
311
ARE QUEUES EMPTY?
312
ARE QUEUES EMPTY?
313
ARE QUEUES EMPTY?
314
ARE QUEUES EMPTY?
315
ARE QUEUES EMPTY?
YES
YES
YES
YES
NO
NO
NO
NO
NO
A

FIG. 3B

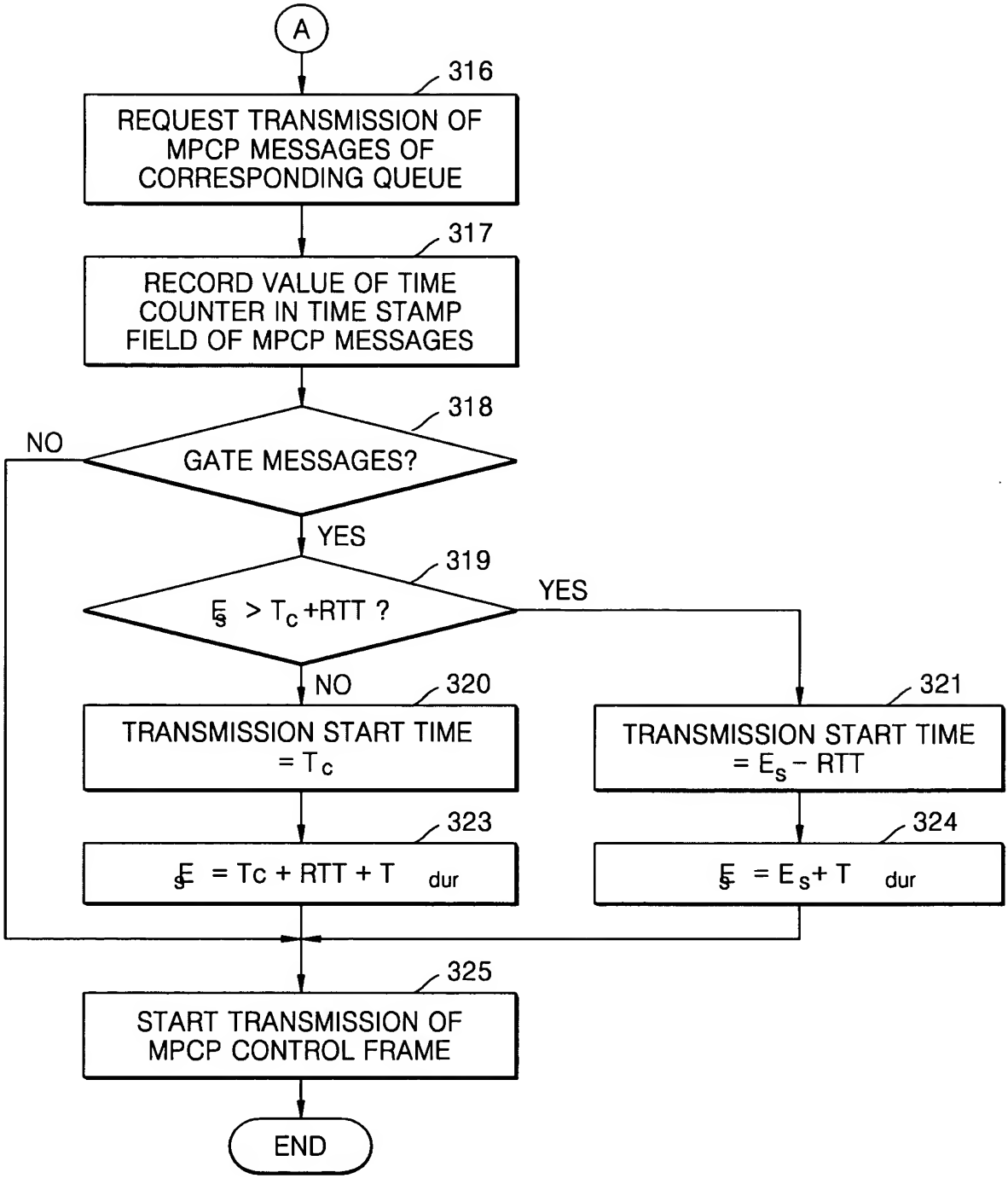
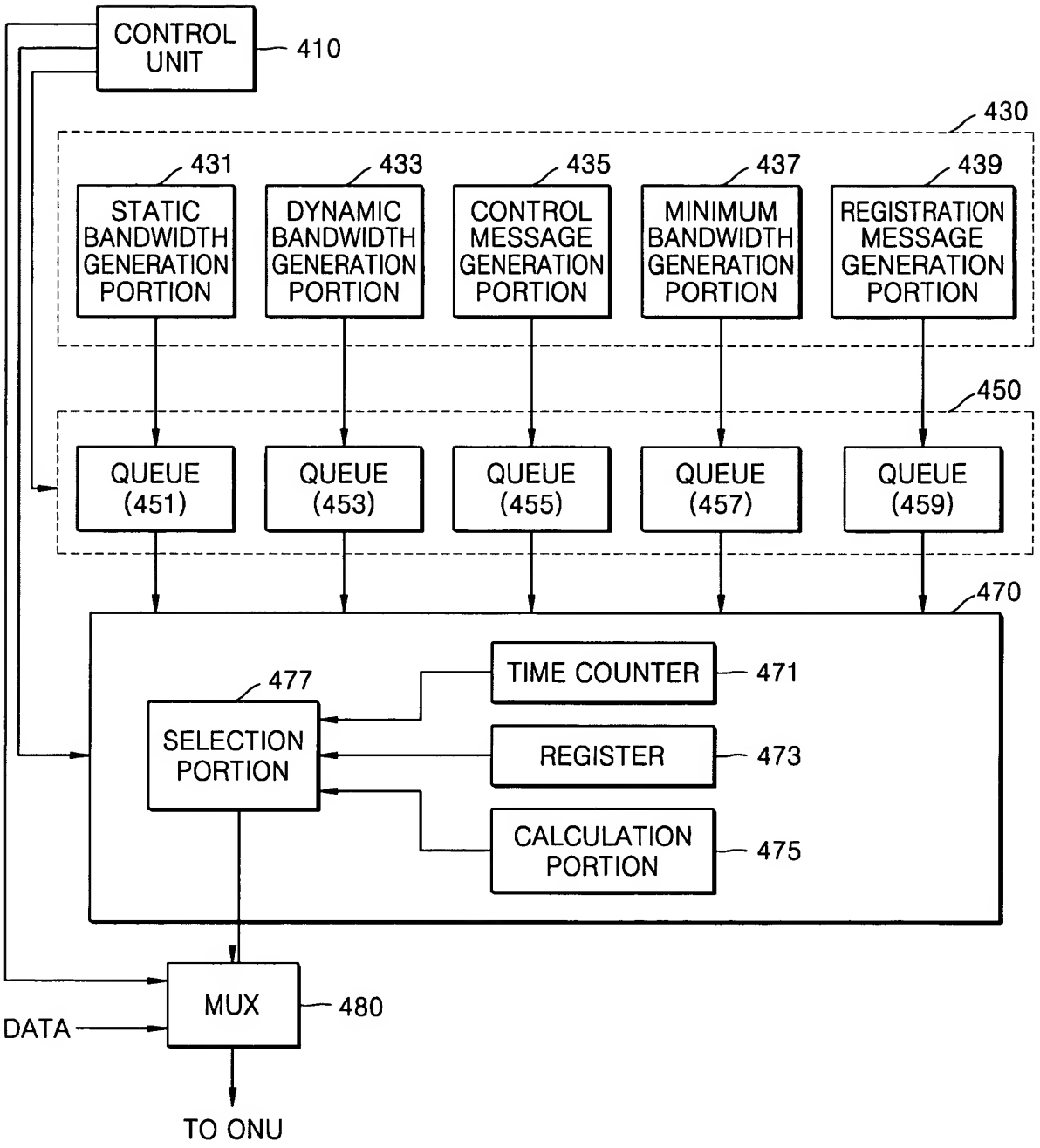

A
316
REQUEST TRANSMISSION OF MPCP MESSAGES OF CORRESPONDING QUEUE
317
RECORD VALUE OF TIME COUNTER IN TIME STAMP FIELD OF MPCP MESSAGES
318
GATE MESSAGES?
NO
YES
319
$E_s > T_c + RTT$?
YES
NO
320
TRANSMISSION START TIME = T_c
321
TRANSMISSION START TIME = $E_s - RTT$
323
$E_s = Tc + RTT + T_{dur}$
324
$E_s = E_s + T_{dur}$
325
START TRANSMISSION OF MPCP CONTROL FRAME
END

FIG. 4


CONTROL UNIT
410
430
431
STATIC BANDWIDTH GENERATION PORTION
433
DYNAMIC BANDWIDTH GENERATION PORTION
435
CONTROL MESSAGE GENERATION PORTION
437
MINIMUM BANDWIDTH GENERATION PORTION
439
REGISTRATION MESSAGE GENERATION PORTION
450
QUEUE (451)
QUEUE (453)
QUEUE (455)
QUEUE (457)
QUEUE (459)
470
477
SELECTION PORTION
TIME COUNTER
471
REGISTER
473
CALCULATION PORTION
475
MUX
480
DATA
TO ONU